UNITED
NATIONS

S

Security Council

Distr.
GENERAL

S/1994/355
25 March 1994

ORIGINAL: ENGLISH

NOTE BY THE SECRETARY-GENERAL

The Secretary-General has the honour to transmit to the members of the Security Council the attached communication which he has received from the Acting Director-General of the International Atomic Energy Agency (IAEA).

Annex

Letter dated 23 March 1994 from the Acting Director-General of the International Atomic Energy Agency addressed to the Secretary-General

Please find attached the report of the twenty-third IAEA inspection in Iraq under Security Council resolution 687 (1991). You may deem it appropriate to transmit the report to the members of the Security Council. The Director-General remains, of course, available with the Chief Inspector, Mr. Garry Dillon, for any consultations you or the Council may wish to have.

(Signed) Boris SEMENOV
Acting Director-General

Appendix

Report covering the period 4-11 February 1994 on the Twenty-Third International Atomic Energy Agency on-Site Inspection in Iraq under Security Council Resolution 687 (1991)

SALIENT POINTS

- The objectives of the twenty third IAEA inspection in Iraq involved the implementation of activities in connection with the on-going monitoring and verification plan (OMV); inspections at sites with previous nuclear or nuclear related missions in order to clarify details of reports prepared by Iraq in accordance with Annex 2 of the OMV; clarification of matters related to the origin and usage of natural uranium; installation of a surveillance system in a machine-tool workshop; confirmation of the status of Tamuz-1 and Tamuz-2 reactor components; clarification of some results obtained by UNSCOM in the course of the second gamma survey exercise. A total of 41 facilities, installations and sites were visited in the course of this inspection.

- Monitoring inspections were carried out at eight sites with previous nuclear or nuclear related missions. Additionally inspections were carried out at sites where items of equipment subject to monitoring in accordance with Annex 3 of the OMV were located and at a small number of randomly selected sites which had been declared to have power supplies exceeding 10 MVA. Requests were received from the Iraqi side for the release, for alternative usage, of equipment and materials from Tuwaitha, Al Qaim and Tarmiya. To the extent practicable the equipment and material was examined during the inspection visits and a formal response will be provided to Iraq in due course.

- Further progress was made in the course of the inspection in clarifying, with the Iraqi side, the required scope and preferred format for the reports submitted in accordance with Annex 2 of the IAEA's OMV plan. Priority of review was given to reports related to those facilities, installations or sites which had been identified as having a previous nuclear or nuclear related utilisation. It was agreed that Iraq would, on an urgent basis, provide updated reports on all sites subject to reporting in accordance with Annex 2 and Annex 3 of the OMV.

- The work started in IAEA-22, involving the detailed microscopic examination, bulk density assessments and sampling for chemical analysis of UO_2, declared by the Iraqi side to have been supplied by Brazil, was continued. The results of this work support a conclusion that the material is of Brazilian origin but, as previously reported, the assistance of the Brazilian Government will be necessary to corroborate this conclusion.

- A surveillance system was installed and commissioned in the "vertical boring machines workshop" at Um Al Ma'arik. The surveillance system is designed to provide a means of continuous monitoring of the nature of the work pieces processed in that workshop.

- Verification of the inventory of the "sensitive" components of the Tamuz reactors, TMZ-1 and TMZ-2 was carried out with the assistance of an expert from France.

- A number of ground level gamma spectrometric measurements were made at Tuwaitha, Al Jesira and Al Atheer with the purpose of clarifying some of the readings obtained by UNSCOM during the second gamma survey exercise.

- The second and final consignment of irradiated fuel, contained in four shielded transport flasks, was transferred to the Habbaniya airport on the last day of IAEA-23 and was successfully transported, by air, to the Russian Federation on 1994-03-12.

- The planned transfer of the HMX material to alternative storage in Bunker # 3 at Muthanna was postponed in consideration of the ongoing activities of UNSCOM 68. These activities resulted in the need for full protective clothing, including respiratory protection, for all personnel entering the bunker area and it was clear that, until all toxic agents were satisfactorily destroyed or contained, the handling of HMX would entail unnecessary risk.

INTRODUCTION

1. This report summarises the results of the twenty-third inspection carried out in Iraq by the IAEA under the United Nations Security Council resolution 687 (1991), with the assistance and co-operation of the Special Commission of the United Nations. The inspection took place from 4 to 11 February 1994 and was headed by Mr. Garry Dillon of the IAEA as Chief Inspector. The team consisted of 17 inspectors (comprising 12 nationalities).

2. The objectives of the inspection were:

   - to conduct inspections at facilities, installations or sites previously visited in connection with Annex 2 of the on-going monitoring and verification plan (OMV) and discussions with the Iraqi counterparts on the scope and format of the related reports.

   - to conduct inspections at sites in connection with equipment declarations in accordance with Annex 3 of the OMV;

   - to continue the work initiated in IAEA-22 regarding the origin and usage of natural uranium;

   - to install a video surveillance system through which to monitor the nature of the workpieces processed in the "vertical boring machines" workshop at Um Al Ma'arik;

   - to locate and identify the major components and spare parts of the Tamuz-1 and Tamuz-2 reactors and to clarify the heavy water balance of the installation;

   - to conduct ground level gamma spectrometric measurements in order to investigate some of the signals detected in the course of the second gamma survey exercise carried out by UNSCOM in December 1993.

   - to monitor the progress of the ongoing task of removing all of the irradiated enriched uranium from Iraq.

The originally planned activity to witness the relocation of the HMX currently in sealed storage in Al QaQaa was postponed to a later inspection.

3. The 41 facilities, installations or sites visited during the inspection are listed in Table 1.

ACTIVITIES AT SITES WITH PREVIOUS NUCLEAR OR NUCLEAR RELATED MISSIONS

4. Inspections were made at the eight sites with previous nuclear or nuclear related missions viz: Tuwaitha, Al Sharqat, Al Jesira, Tarmiya, Rashdiya, Al Qaim, Al Atheer (Firnas) and Al Furat in order, inter alia, to further clarify the information contained in reports submitted by Iraq, in April, August and November 1993, in accordance with Annex 2 of the OMV.

5. In the course of the first of these inspections (at Tuwaitha) the requirements for the scope and format for the above mentioned reports were discussed in detail with the Iraqi counterparts. It was agreed that priority would be given to the preparation of two sets of reports for each of the relevant facilities, installations or sites. The first set of reports would describe the status and ongoing activities of the facilities, installations or sites as of 1989-01-01 and the second set of reports would describe the status of the facilities, installations or sites as of 1993-12-31 and describe the activities undertaken during the preceding six-month period. Subsequently, discussions were held with the respective Directors General, or their representatives, at the other sites and assurance was received that work was in progress, with high priority, to prepare revised reports.

6. Further discussions were held with the Iraqi counterparts during a mid-inspection progress meeting and at the inspection closing meeting where additional aspects of the requirements for these reports were further clarified and the Iraqi side stated their intention to forward the two sets of reports during the week following the inspection. UNSCOM-Baghdad informed the IAEA that a large number of reports were actually delivered to them on 1994-03-03.

7. In response to requests from the Iraqi side for the release of certain items of equipment and material the team allocated resources to examine the items involved during visits to Tuwaitha, Tarmiya and Al Qaim. It was evident that the staff at Al Qaim were unprepared for the inspection and much time was lost in attempting to locate and identify the equipment involved. This activity will need to be continued at the next inspection at which time it is expected that the requested estimate of the uranium hold-up in the plant will be provided by the facility management. Formal requests have been received with respect to the Tuwaitha and Al Qaim sites and a list of items, for which release would be requested, was handed to the team during the inspection at Tarmiya. These requests are receiving attention and a formal response will be provided to Iraq in due course.

8. Samples of dilute phosphoric acid and tri-superphosphate product were taken from Al Qaim and a sample of furnace lining cement, which was detected to contain traces of radioactivity, was taken from Rashdiya.

ACTIVITIES RELATED TO EQUIPMENT

9. During IAEA-23 35 facilities, installations and sites were visited in connection with the inspection of equipment subject to monitoring in accordance with Annex 3 of the OMV. Three of these locations, as indicated in Table 1, were visited for the first time by an IAEA inspection team. Several of the inspections were carried out at short notice.

10. A number of machine-tools which were declared, during IAEA-22, in accordance with Annex 3 of the OMV were newly tag-sealed and tag-seals were detached from a number of machine-tools which have been determined not to meet the Annex 3 criteria. Good progress was made in the consolidation of the list of machine-tools covered by Annex 3 of the OMV but some further work will be necessary to ensure that the list is comprehensive. Progress was also made in the specification of inspection procedures with respect to the ongoing monitoring of machine-tools.

11. Substantial progress has been made in verifying the inventory of the Matrix-Churchill CNC turning machines imported into Iraq and in determining whether any of these machines are of a quality that would require their declaration and monitoring in accordance with Annex 3 of the OMV. In November 1993 the Iraqi side stated that a total of 278 Matrix Churchill CNC turning machines had been delivered. This number corresponds closely to the figure of 280 provided by UK authorities, based on their review of export licences. To date 272 Matrix-Churchill CNC turning machines have been located and examined by IAEA inspection teams in Iraq. Their distribution is summarised in Table 2. Machine-tool experts, who assisted the IAEA in the evaluation of the capability of these machines, have advised that none of the identified machines are of a quality that would require their declaration and monitoring in accordance with Annex 3 of the OMV. Furthermore a written statement has been provided by the successor company to Matrix-Churchill certifying that none of the Matrix-Churchill turning machines supplied to Iraq would meet the Annex 3 quality specification. In view of this statement and the comprehensive corroboration obtained through inspection it has been determined that none of the 280 Matrix-Churchill turning machines supplied to Iraq would be subject to declaration and monitoring in accordance with Annex 3 of the OMV.

12. In conjunction with inspections of equipment subject to Annex 3 of the OMV the opportunity was taken to inspect, at short notice, the General Establishment for Fertilisers at Basrah which, in accordance with paragraph 22 (f) of the OMV, had been identified as a location with a means of power supply greater than 10 MVA. The establishment, which has a sub-station rated at 40 MVA is a major producer of urea and ammonia.

ACTIVITIES RELATED TO THE INVENTORY OF NUCLEAR MATERIAL

13. The material contained in 59 drums of waste declared to have been transferred to Location C from evaporation tank B at Al Jesira was examined and its appearance was found to be consistent with its stated origin. On the basis of ad hoc non-destructive measurements the uranium content of the total consignment was estimated to be 50 Kg (+/- 50%), which represents an insignificant contribution to the outstanding balance of 5,300 Kg in the material assigned, in the FFC[1], to the "Waste retention basin" at Al Jesira. Samples were taken for analysis but it is not expected that the results of this analysis will greatly influence the above estimate. The drums are now stored between the inner and outer doors of the right side storage at Location C.

14. In addition to the waste drums, a consignment, declared to comprise 144 filters from Al Jesira, packaged in 103 plastic sacks had been transferred to Location C and was stored on the concreted area outside the left side storage. The packaging was badly damaged and presented a significant risk of spread of uranium contamination. Indeed some uranium compound had already spilled out onto the ground. With the assistance of the Iraqi counterparts prompt action was taken to repackage the filters and transfer them to storage between the inner and outer doors of the left side storage at Location C.

[1] Full final and complete report required under UN Security Council Resolution 707 (1991). This report entitled "Iraqi Nuclear Programme before and after SCR 687" was prepared by the Iraqi Atomic Energy Commission in June 1992. The report includes a "Nuclear material flow chart" which records a total amount of 13 tonnes of natural uranium to be accumulated in the three evaporation tanks which make up the "Waste retention basin" at Al Jesira. The material recovered from tank C was sampled during IAEA-15 and the results of analysis showed the natural uranium content to be 7,700 Kg +/- 300 Kg, thus indicating that the content of the remaining two tanks should be of the order of 5,300 Kg.

15. In the course of this transfer an estimate of the total number of filters was made which was in reasonable agreement with the declaration. An estimate of the weight of contained uranium compound was made indicating that the filters contain some 400 Kg (+/- 25%) of uranium compounds. Samples have been taken for analysis. The material collected on the filters appeared to be either yellowcake or UO_3 and the loading of the filters varied considerably giving the impression that they had been used in a serial arrangement of primary and secondary banks. Some filters showed only minor discoloration whereas others were almost blocked indicating that they had probably been used as primary filters in a ventilation system servicing a location with a very high concentration of suspended particulate. It is not clear from which part of the process at Al Jesira these filters originate and clarification will be sought from the Iraqi counterparts.

16. The work started in IAEA-22 on the characterisation of the UO_2 material declared to be of Brazilian origin was continued and a clearer understanding was obtained with respect to the probable distribution of material between the two declared consignments. No additional activities are foreseen for this topic pending assessment of the results of analysis of the samples taken during IAEA-22 and IAEA-23. A request has been made to the Brazilian government for the provision of information through which to corroborate the findings of this examination.

17. There is still some confusion with respect to the location of the filters removed from the Building 73 complex and the associated filter bank housing. The Iraqi counterparts have again been asked to locate these items and to make them available for inspection.

ACTIVITIES RELATED TO SURVEILLANCE SYSTEM INSTALLATION

18. A video surveillance system, comprising two television based units, backed up by two film camera units, was installed in the "vertical boring machines" workshop at Um Al Ma'arik, formerly Auqba Bin Nafi, where the major components of the EMIS modules had been fabricated. The surveillance system is designed to monitor the nature of the workpieces processed in this workshop.

19. The Iraqi counterparts and the Director General of Um Al Ma'arik undertook to use their best endeavours to ensure: continuity of power supplies to the surveillance system; continuity of illumination in the workshop, at a level not less than 50% of full capacity and avoidance of obstruction of the field of view of the cameras. They also undertook to ensure that any ad hoc lighting systems used in the workshop are not directed towards the surveillance cameras and that administrative measures would be introduced to prevent accidental switching off of power supplies or illumination.

20. In discussions following completion of the installation the facility management stated that they understood the need for continuity of power supplies and illumination but, in view of the current situation in Iraq, no guarantees could be made. Full assistance was provided by the facility management and technical staff to facilitate the installation of the video surveillance system.

ACTIVITIES RELATED TO THE TAMUZ-1 / TAMUZ-2 REACTORS

21. A comprehensive inspection of the inventory of the major components of the Tamuz-1 (TMZ-1) and Tamuz-2 (TMZ-2) reactors was carried out with the active participation of an expert from the supplier state. The work involved inspections at the TMZ-1 and TMZ-2 sites, at the Al Shaykhili warehouse and at an external warehouse. The lower water box, the tubular block and six control rod mechanisms were declared to remain in the TMZ-1 pool and access to these components is impossible at this stage because the basement of the reactor building is completely flooded with water. The reactor lower water box, the core grid and the chimney were observed to remain in place in the TMZ-2 reactor pool. With these exceptions, of all of the sensitive components of both reactors were directly examined. Schematic diagrams of the reactors are appended as figures 1 and 2.

22. In addition to the above inspection activities the inspectors interviewed the principal IAEC staff who had been most closely involved with the project. Although it was not possible to account for some 700 to 900 litres of the TMZ-2 heavy water inventory, which was claimed to have been lost or fully degraded through bomb-damage during the Gulf war, the explanation of the loss mechanisms was accepted as being credible. It is also relevant to note that an additional 1,000 to 1,100 litres of the TMZ-1 heavy water inventory was reported to have been lost or fully degraded as a result of the Israeli bombing in 1981.

23. The conclusions and recommendations resulting from these inspection activities record that all of the sensitive components of the Tamuz-1 and Tamuz-2 reactors, listed in the legends of figures 1 and 2, had been satisfactorily accounted for, with the exception of items 1, 2 and 3 of figure 1, as explained in paragraph 21. No further action is required in this regard. Similarly, no further follow-up action is recommended with respect to the heavy water inventory in view of the relatively small amount involved. It is however recommended that arrangements be made to remove the high intensity gamma source from one of the damaged hot cells and subsequently, to recover the hoists and tele-manipulators and transfer them to secure storage.

ACTIVITIES RELATED TO THE 2nd UNSCOM GAMMA SURVEY EXERCISE

24. High resolution gamma spectrometric measurements were made at a number of locations identified during the second UNSCOM gamma exercise. The data obtained from measurements made at Tuwaitha, Al Jesira and Al Atheer are undergoing detailed evaluation but preliminary results indicate that the radiation signals detected at the measured points probably relate to accumulated radioactive waste, radioactive contamination resulting from bombing during the Gulf War or to high intensity sources used in lightning rods.

ACTIVITIES RELATED TO THE PLANNED HMX RELOCATION

25. The planned transfer to Muthanna of the HMX explosive material, currently in sealed storage at Al QaQaa, was postponed because the work in progress by UNSCOM 68 had required the imposition of stringent safety precautions at the Muthanna site. Not only would the requirement to wear full protective clothing, including respiratory protection, have greatly complicated the task but the handling of explosive material in a an area potentially contaminated with toxic agents would have involved unnecessary risks. The bunker area of the Muthanna site will be visited, as conditions permit, in order to confirm that the modifications required to ensure secure storage have been made, following which the arrangements for the relocation of the HMX material will be rescheduled.

ACTIVITIES RELATED TO REMOVAL OF IRRADIATED ENRICHED URANIUM

26. The second and final consignment of irradiated enriched uranium fuel was successfully packaged and shipped from Iraq at the conclusion of IAEA-23. The remaining irradiated fuel which had been stored at Location B and at the IRT reactor site was cleaned and transferred to four shielded transport flasks. The flasks were then tested, sealed and loaded into ISO containers and transported, by road, to Habbaniya airport on 1994-02-11. IAEA radiation protection staff were in attendance throughout the exercise and an ICAO/IATA Dangerous Cargo Inspector was present to review the documentation and inspect the loaded flasks and ancillary equipment that was to be shipped. The fuel flasks and ancillary equipment were loaded onto an Antonov 124 on 1994-03-12 and flown to Ekaterinburg the same day.

27. This shipment completed the task of removing all of the, direct weapons usable, nuclear material from Iraq.

Table 1. Locations Visited during IAEA-23

	Tuwaitha	
	Al Shaykhili	
	Location C	
	Um Al Ma'arik	
	Hatteen	
	Iskandaria	
	Al Rafah	
	Al Ameer	
	Lead Smelting Factory	Fallujah
	Binwalid	
	Al Sharqat	
	Al Radwan	
	Ibn Al Haytham	
	Al Kindi	
	Al Jesira	
	State Establishment for Electrical Industry	
	Al Karama	
	Salah Al Din	
	Nassr	Taji
	Tarmiya	
	General Establishment for Iron & Steel	Basrah
	Rashdiya	
*	General Establishment for Fertilisers	Basrah
	Al Qaim	
	Al Nidda	
	Zaura	
	State Enterprise for Heavy Eng. Equipment	Daura
*	General Establishment for Wool Industry	Kademiya, Baghdad
	Al Mufahid Mechanical Design Centre	Schuala
	MIC storage	Baghdad North Gate
	Al Qa Qaa	
	Iskandariya car factory	
	Badr	
	Al Kadesiya	
	Industrial Engine Factory	Daura
	- Zemzem 75	Storage Site
	- Muharrik Al Senal	Diesel motor production
	Al Atheer	
	Geological Survey Pilot Plant	Baghdad
	Al Furat Project Site	Al Walid
	Al Mansour Electronics Factory	
	Space Research Centre	Ibn Al Haytham
*	Military factory	15 Km south of Falluja

* *Visited for the first time*

/...

Table 2. Distribution of Matrix-Churchill CNC Turning Machines

LOCATION	IRAQI DECLARED 2.11.93	DECLARED SHIPPED BY UK	SEEN BY IAEA	NOT SEEN BY IAEA
Hatteen	102	102	102	0
Nassr (Taji)	69	57	69	0
Al Nahrawan	51	53	50	1
Al Radwan	2	0	1	1
Al Ameer	2	0	2	0
Salah-Al-Din	1	0	0	1
Binwalid	6	0	3	3
Zaura	1	0	1	0
Al Nidda	4	0	4	0
Basra Steel Mill	2	0	2	0
Wool Textile Est.	1	0	1	0
Ibn Al Haytham	1	0	1	0
Ind Engine Factory	2	0	2	0
Um-Al-Marik	3	0	3	0
Badr	3	0	3	0
Al Qa Qaa	2	0	2	0
State Elec. Est.	13	0	13	0
MIC Storage	3	0	3	0
Al Karama	10	0	10	0
Vot-Nassr (kits) *		68		
	278	280	272	6

* 68 Matrix-Churchill turning machines were supplied to Iraq in kit form and were distributed to various locations following assembly. The turning machines constructed from kits are identifiable through the Vot-Nassr nameplate.

Figure 1. Schematic diagram of the Tamuz-1 reactor

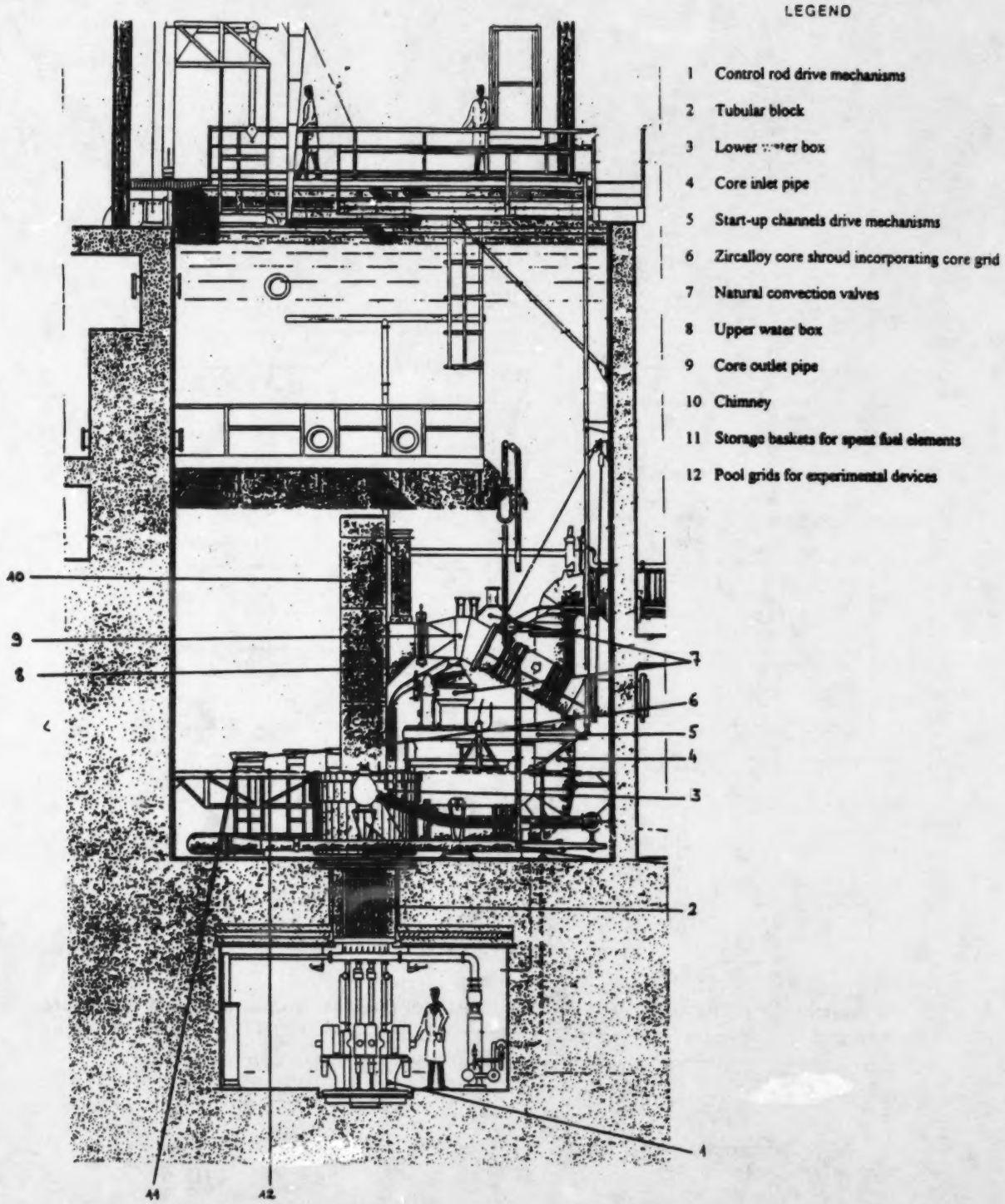
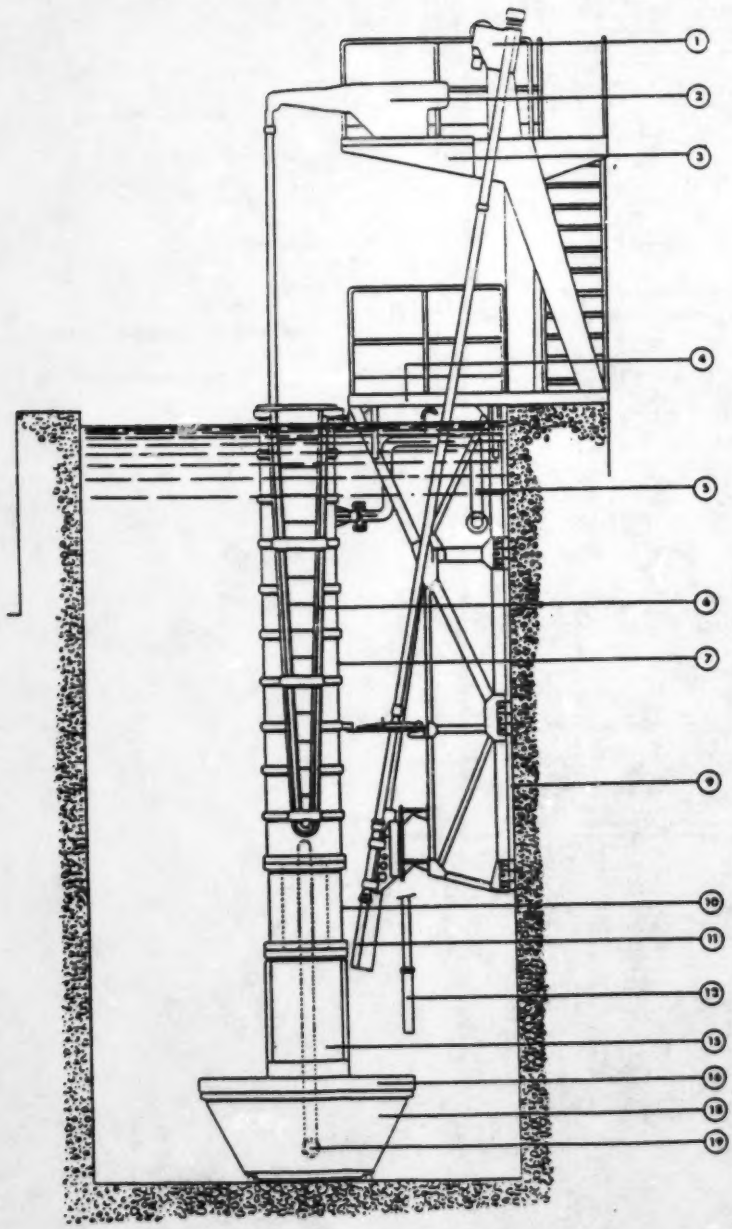


Figure 2. Schematic diagram of the Tamuz-2 reactor



LEGEND

1 Nuclear chambers mechanisms
2 Control rods mechanisms
3 Control rod drive stand
4 Catwalk
5 Primary circuit outlet
6 Movable cofferdam
7 Stainless steel chimney

9 Stainless steel liner
10 AG3 aluminium chimney
11 Detector for automatic flux control channel
12 Detector for power adjustment channel

15 Core grid
16 External grid

18 Water box
19 Primary circuit inlet